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Evidence of innovation in Lithuanian low-tech sector: case study analysis

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Abstract

In general low-tech sector is considered as having small potential for innovation. Measuring innovation by the most popular indicator in scientific literature such as investment in R&D the low-tech sector definitely will be in the bottom of high-tech leaders. It should be admitted that relying on investment in R&D is too narrow if we consider the multifaceted nature of innovation. Thus the case study method was employed to have an in-depth look on the innovation evidence in the low-tech sector. Findings show that a persistent struggle of the low-tech sector to take the high earning markets and to produce the high quality products give an impetus to be in line with the current technologies. Thus the technological potential is the core factor for competitiveness in the low-tech sector.

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Keywords: Low-tech sector; innovation; case study method.

1. Introduction

The economic crisis that passed in 2008-2009 showed the main constituent for Lithuanian recovery was the export oriented economy. Moreover, low-tech sector that is on the back seat of high-tech and beyond the innovation headlines in Lithuania's strategy has survived and managed to rise for a new start. The low-tech sector is considered of being one that spurs the economic growth and one that creates huge amount of work places not only in Lithuania

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(Pridotkiene, Laskiene, Venckuviene, 2013), but in advanced European economies, such as Germany, as well (Hirsch-Kreinsen, 2006; Kirner, Kinkel and Jaeger, 2009).

The purpose of the paper is to explore in-depth the multifaceted nature of innovations in low-tech sector in Lithuania.

The topic of this article is not the unique one but the problem that is raised – what is the nature of innovations and how it is expressed in low-tech industry - is relevant and up-to-date. The identification of diversity of innovation in low-tech sector enables to look at a whole sector environment, to envisage the main factors for the better performance of this sector and to tailor the most appropriate government's measures in order to improve the current situation. This research contributes to the scientific scope analysing low-tech in terms of innovation capabilities using qualitative methodology perspective.

Volumes are written on innovation topic, and the most popular typology of innovation is presented in the OECD Oslo manual (2005). Despite of wide adaptation of this classification many authors agree that the nature of innovations embeds more dimensions than the OECD manual does (Rogers, 1998; Sawhney et al., 2006).

Due to a multifaceted nature of innovation measurement of them requires a complex system (Rogers, 1998; Sawhney et al., 2006). Innovation reflects the quantitative and qualitative aspect as well. It encompasses indicators such as R&D expenditures, patents, trademarks and designs, as well as costs of training, investments, marketing and new technologies (Rogers, 1998).

Hirsch-Kreinsen (2006) argued that the classification of sectors into four groups (high-tech, medium-high-tech, medium-low-tech, low-tech) should be rethought as it doesn't reflect the real innovative potential in low-tech sector. Other scholars found that low-tech companies not only encompass a great variety of innovation types (Santamaria et al., 2009; Heidenreich, 2009), but may inspire higher technology sectors to create innovations that later are used by low-tech and in that way higher technology sectors even become dependent on low-tech's success in the market in the long-run (Robertson, Patel, 2007).

The paper is organized as follows: first, the appropriate methodology to research the raised question is reviewed; second, results of the qualitative research are discussed. Paper ends with the conclusions.

2. Method

One of the ways to do in-depth research in social sciences is to employ a case study method. This method was widely investigated by Yin (2009), who highlighted the importance of planning, preparing design, preparation, collection, analysis and sharing phases. The decision to do case study research was made due to the lack of in-depth view on the innovation multifaceted nature in low-tech sector in Lithuania.

The semi-structured interview method was employed in order to get as many information as possible. Thus the research instrument was prepared which embedded the open-ended questions covering such topics as: innovation activities in enterprises; international competition and the threats; the newly growing economic centres and unfair competition in international markets; the newly growing economic centres, development and analysis of competitive conditions in the context of threats; factors of the competitive advantage.

In this paper we focus on the innovation phenomena and its evidences in the companies' performance in terms of production process (product and technological innovations), management, and marketing innovation dimensions.

The target companies were chosen from the following three branches of manufacturing industry: Textile and the apparel production; Wood, wood products and paper production; Furniture production. When making the sample list of potential case study participants, the leading companies of each branch were selected (considered, that is why companies from top exporters, or top innovators or other outstanding companies from a particular industry were selected). The criteria for the sample companies were set up as follows:

- accumulated export experience, at least 5 years;
- significant export share, not less than 2/3 of the turnover;
- financially successful.

The interviews were organised with the top team members of each company. The Table 1 depicts the main characteristics of the sampled companies in the case study research. The interview were anonymous, thus the identification of sample companies is limited. In respect of number of employees three of selected companies are middle companies and three of them large ones.

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Table 1. Characteristics of selected companies

Companies code	Industry branch	Export experience (years)	Export share in total production, percentage
T1	Textile and apparel	8	99
T2	Textile and apparel	18	95
M1	Wood, wood products and paper	13	80
M2	Wood, wood products and paper	20	70
B1	Furniture manufacturing	12	100
B2	Furniture manufacturing	18	85

Data analysis method. To generate the results of case study, the qualitative content analysis method was chosen. Coding of information is essential in processing qualitative content analysis (Mayring, 2000; Hsieh and Shannon, 2005). There are many types of coding the initial data and it depends on theoretical background. For instance, Hsieh and Shannon (2005) explore three types of approach: conventional content analysis, directed approach and summative content analysis. The differences are based on whether the coding categories are derived from the text data or based on the theoretical background or specifically focusing on the analysed context (Hsieh and Shannon, 2005). The coding in this research was based on withdrawing categories directly from the raw data in the interview protocols.

3. Results

When analysing the innovation potential of surveyed companies the main categories for innovation characteristics were extracted (see table 2). Companies operating in Lithuania produce both standardized and niche products. However the latter category is not inherent in all analysed branches. Specifically the product innovation category is typical rather in textile sector than wood, furniture or paper manufacturing. Since the creation of a product depends on the complexity of enterprise processes, and at the same time on technological level, that is why technological innovation is the category of innovation extremely well representing the manufacturing sector. It is particularly in line with findings from a quantitative research of Kirner, Kinkel and Jaeger (2009) “that low-technology manufacturing firms lag behind their medium- and high-tech counterparts regarding their product and service innovation performance, to a large degree on purely definitional grounds, but that they seem to perform equally well and in some respects even better at process innovation”.

The case study showed that typically, the development of a standardized product is easier because the production line is tailored to a specific product, and if introducing innovations there is a need to change the production process, the lines, therefore the need for additional new equipment (a new technology, materials) arises. And this leads to higher demand for investments.

Table 2. Innovation dimensions in a low-tech companies

Category	Sub-category
Product Innovation	Standardized product
	New generation product
	Niche product
Technological Innovation	Application of equipment manufacturers' innovation
	Use of the latest technology
	Production improvement
	Use of robots
	Establishment of laboratory (equipment)
	Installation of a new line
	Enterprise modernization
	Changes in work processes
	Computerized production records
	Computerized manufacturing monitoring
Marketing Innovation	Certification of eco-labelled products
	Improvement of product packages
	Positioning as a socially responsible company
	Searching for a new advertising solutions
	Design patenting
	Significant product development evolution
Organizational Innovation	Implementation of business management systems
	Improvement of organizational and production processes
	Introduction of good manufacturing practice
	Introduction of ISO standards
Networking Innovation features	Participation in R&D projects
	Alignment with the producers of raw materials
	Search for external specialists (researchers)
	Communication with customers' technologists
	Search for device suppliers
Eco-innovation	Efficient use of raw materials
	Pollution reduction (harmonization of environmental requirements)

The findings from the interview support that there are some evidences of marketing innovations. This category is advocated by such categories like certification of eco-labelled products; improvement of product packages; positioning as a socially responsible company; searching for new advertising solutions, design patenting.

Evidences on organizational innovations are justified as well. Most of respondents admitted that there are huge attempts in improving organizations' performance in term of management scope. Already implemented business management systems, improvement of organizational and production processes, introduction of good manufacturing practice and ISO standards make organizational innovations base in Lithuanian low-tech sector.

Moreover the case study research revealed some new dimensions in measuring innovation. Firstly, evidences on networking related innovations emerged. It embeds complex activities such as participation in R&D projects, alignment with the producers of raw materials, search and attraction for external specialists (researchers), communication with customers' technologists and search for device suppliers. These categories imply that innovations are made in the network, and communication in the whole value chain is becoming extremely important.

Secondly, the evidences of eco-innovation activities such as efficient use of raw materials and diminishing the harm effect to the environment were identified.

To sum up the results, it should be admitted that a persistent struggle of the low-tech sector to take the high earning markets and to produce the high quality products gives an impetus to be in line with the current technologies. Thus the technological potential is the core factor for competitiveness in low-tech sector, but in addition the evidences of other type of innovations are obvious.

4. Conclusions

Along to the results of Hirsch-Kreinsen (2006) we argue that there is a need of broad consideration about the multifaceted nature of innovation in the low-tech sector. The main innovation indicators such as "share of

investment in R&D" and "number of patents" do not reflect the real situation. Many creative activities in a company can be treated as innovation.

The scientific literature shows that investment in R&D and R D personnel working in the field are the main indicators for the level of innovation in the company. Meanwhile, in an interview with the heads of the companies revealed that there is a problem in naming the innovation processes in the company and identifying investments in R&D activities. Often companies do not distinguish organizational innovations as such, they just are not identified. Respondents note that there is a lack of information at national level to identify innovations in the enterprise, how to account them, therefore there is some space for system improvement. Despite that the research shows that Lithuanian low-tech sector companies are innovative and demonstrate innovations in various areas, the importance of this sector is still not enough clarified. Specifically the government's role in promoting the performance of low-tech sector in terms of relaxing labour market regulations, training of relevant specialists, enhancing low-tech technological progression is necessary.

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